(3) He built the first internal-combustion motor suitable for a practical man-carrying aeroplane.

(4) He developed and successfully launched the first gasoline model aeroplane capable of sustained free flight.

(5) He developed and built the first man-carrying aeroplane capable of sustained free flight.

Only the last of these items appears to be in dispute, and, even were adverse criticism justified, the merit of Langley's work would scarcely be affected. It is not disputed on the other side that the Wright brothers made the first sustained flight and so marked a stage of progress which appealed to the world at large instead of to a limited number of men of science. The list of earlier contributors to progress in aviation is long, and all deserve some credit for the ultimate result, but the modern phase took its beginning with the publication of Langley's researches on aerofoils, etc., and the additional spur given by the successful flights of his power-driven models.

It is not too much to say that more original and personal solid work underlay the Langley aeroplane than is the case for any other aeroplane, not excepting those of the present day. The solution of the problems of stability which Langley reached as a pioneer in one instance is still beyond the powers of the majority of his successors in the art of aeroplane design.

Intestinal Protozoa of Man

The Intestinal Protozoa of Man. By Clifford Dobell and F. W. O'Connor. Pp. xii+211+8 plates. (London: Published for the Medical Research Council by J. Bale, Sons, and Danielsson, Ltd., 1921.) 15*s.* net.

THIS is a treatise which will be very valuable to the medical investigator of the microscopic intestinal parasites of man—other than those belonging to the great group of Bacteria. Its origin is due to the continuous and comprehensive study, made during the great war, of the relation to parasitic Protozoa of dysenteric disease occurring in the British Army. Mr. Clifford Dobell has previously published various reports of his masterly work on this subject, and two years ago (December 11, 1919, vol. 104, p. 369) we noticed in these columns his critical essay entitled "The Amœbæ Living in Man." In the present publication Mr. Dobell has been assisted by Mr. F. W. O'Connor, who had independently carried on investigations on intestinal Protozoa in connection with the Egyptian Expeditionary Force. Mr. O'Connor was to have been specially responsible for the medical parts of this book, and Mr. Dobell for those parts which are purely zoological. But, owing to the departure of his medical colleague in 1919 on an expedition to the Gilbert and Ellice Islands, the task of completion of the work and responsibility for the greater part of it have fallen on Mr. Dobell. The treatise is distinguished by that patient inquiry into previous work and critical judgment as to nomenclature and synonomy which have rendered Mr. Dobell's earlier publications of special value. It is absolutely necessary that medical men and protozoologists should agree upon a terminology in order that they may understand each other's writings, and this result Mr. Dobell's careful review and original observations enable them to achieve.

The book is divided into nine chapters, followed by a very complete bibliography and an index and eight plates. Chap. 1 is an introduction to the whole subject, and is followed by chap. 2 on the intestinal Amœbæ of man; chap. 3, Amœbiasis (the name given to infection by Amœbæ, and especially by *A. histolytica*); chap. 4, the intestinal Flagellates of man; chap. 5, the intestinal Coccidia of man; chap. 6, the intestinal Ciliates of man; chap. 7, the diagnosis of intestinal protozoal infections; chap. 8, the treatment of intestinal protozoal infections; and chap. 9, the coprozoic Protozoa of human fæces.

One of the chief sources of error which has to be guarded against by the novice in this study is that of supposing that parasites found in the fæces are necessarily parasites of the intestine. There is a whole series of Amœba-like and flagellate Protozoa which are present in the soil and may obtain access to, and develop in, the fæces after deposition. These are called "coprozoic Protozoa." They may also obtain access to the fæces by means of resistent spores which are swallowed with dust and pass uninjured and undeveloped into the intestinal contents. Apparently the high temperature of the intestine is unfavourable to their development, which occurs only when they have passed to the cooler conditions of the outer world. Many mistaken descriptions of protozoal parasites have been due to this source of error.

The Protozoa which are not merely coprozoic, but actually live in the intestine of man, are only seventeen in number—viz. five Amœbæ, five Flagellata, four Coccidia, and three Ciliata. Some of these are very rare or exceptional; others are abundant, but are not shown to be harmful. Only two which actually sometimes (but not always) destroy the tissue of the intestinal wall or of other organs when present in man are admitted by Mr. Dobell to be pathogenic—viz. *Entamoeba histolytica* and the ciliate *Balantidium coli*. The work of recent years, and much of that of Messrs. Dobell and O'Connor,

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has led to this interesting result. The tendency among medical men was to regard every intrusive Entozoon in the human body as "a dangerous parasite," and now we know not only that parasitic Protozoa are not necessarily dangerous, but also that many parasitic bacteria and even some worms are not harmful to their hosts.

Mr. Dobell is inclined to modify the ancient and, as it seems to me, convenient use of the word "parasite." It is not usual to regard every parasite as "a dangerous parasite." One hears of a "harmless parasite" also, and of "mere parasites." In fact, the Greek word means "alongside the victuals," and signified in early times one who had a seat at the table of sacrificial meats—an officially established guest or messmate of the priests. He was "venerable" rather than dangerous, and only when rich men took to entertaining such pensioners for the purpose of display and self-advertisement did "the parasite" fall into contempt and was sneered at as a "toady." The use of the word in zoology has been primarily in accordance with this. The parasite of zoology infests or hangs on to a host from which it obtains shelter and food, but it does not necessarily injure its host. There are many gradations between the harmless necessary parasite and the deadly pest which converts a "host" into a "victim"—absorbing its life-blood or spreading deadly poison into its tissues.

It is difficult to create a terminology which shall in single words indicate the varieties of relationship of parasite and host. The word "commensal" was introduced by the elder Van Beneden. Etymologically it has the same meaning as parasite, but Van Beneden used it to signify specifically an association in which the host suffered no injury or inconvenience, but allowed a distinct species of animal or plant to benefit by the scraps of food rejected by itself, and even to get shelter and carriage by its hospitality. At the same time, Van Beneden pointed out that such close parasitism as that of the intestinal worms is not necessarily injurious to the animals infested, and he cited the fact that, whilst in their normal wild condition the larger carnivorous animals apparently without exception harbour parasitic worms and are perfectly healthy, it is found that the same animals in captivity tend to lose their parasites. They, in fact, become unhealthy and abnormal in captivity. The presence in these animals of a few parasites is (according to Van Beneden) normal and an indication of life in health-giving conditions. For such reasons I should prefer to retain the word "parasite" with its original wide and general meaning, and to classify by name (a somewhat troublesome task) the varieties which it presents.

E. RAY LANKESTER.

Electric Furnaces.

The Electric Furnace. By Dr. J. N. Pring. (Monographs on Industrial Chemistry.) Pp. xii + 485 + 19 plates. (London: Longmans, Green and Co., 1921.) 32*s.* net.

LITTLE more than 100 years have elapsed since the first experiments on electric furnaces were performed, when Davy, in 1810, succeeded in isolating aluminium and the alkali metals by the electrolysis of electrically fused salts. Five years later Pepys carried out experiments on the cementation of iron heated by passing an electric current through it. About half a century elapsed, however, before a commercial furnace was put into operation, one of the earliest being built by the Cowles brothers at Milton, Staffs. The development that has taken place since that date may be gauged from the fact that the estimated production of electric furnace steel during 1918, in Great Britain alone, was 110,000 tons. This development was largely due to the war and, as the last edition of Stansfield's classic volume (bearing the same title as the book at present under review) is dated 1914, a demand doubtless exists for a further book on electric furnaces.

After dealing with the history and the principles of electric furnaces, the author discusses the types used in laboratory and experimental work. He claims that it is possible to maintain a temperature of 1200° C. inside a tube 8·6 cm. internal diameter, wound with No. 15 s.w.g. nichrome wire. The makers of this material state that it is suitable for use at temperatures up to 1100° C., and while there is no doubt that the higher temperature could be attained, the author was indeed fortunate if his furnace did not burn out in a short time.

The next two sections of the book deal with current supply and transformation in electric furnace operations. These subjects are discussed very fully, commencing with the theory of alternating currents. There is a mistake in the first figure in this section (Fig. 49), both collector brushes of the diagrammatic dynamo being shown on the one slip ring.

A later section, 6, discusses the measurement of high temperatures, dealing mainly with the use of optical and radiation pyrometers. A curious statement occurs on p. 84, where reference is made to thermo-couples consisting of "two different metals such as platinum and an alloy of platinum with rhodium or ruthenium." Surely iridium, not ruthenium, is intended.

The next three sections deal with the chemical,

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